MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2017/2018

BMT1014 –MANAGERIAL MATHEMATICS

(All sections / Groups)

15 MARCH 2018
2.30 p.m – 4.30 p.m
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This Question paper consists of 5 **pages** including cover page and mathematical formulas with **4 Questions** only.

2. Attempt **ALL** questions and write your answers in the Answer Booklet provided.

3. The candidate is allowed to use scientific calculators that are permitted to be used in the examination.

Question 1 (25 marks)

a) For the straight line $2x + 4y - 3 = 0$,

i. Find slope and y −intercept. **(5 marks)**

ii. Find a line that perpendicular to the line and passing through $(-2, -3)$. **(5 marks)**

iii. Sketch the graph of the straight line $2x + 4y - 3 = 0$. **(5 marks)**

b) A manufacturer sells his product at \$12.50 per unit, selling all he produces. His fixed cost is \$5,000 and his variable cost per unit is \$8.50.

i. Find cost, revenue and profit function. **(4 marks)**

ii. At what level of production will he break even? **(3 marks)**

iii. At what level of production will he have a profit of \$10,000? **(3 marks)**

Question 2 (25 marks)

A manufacturer produces two products, product A and product B. Both products require processing on Machines I and II. The number of hours needed to produce one unit is given by the following chart:

	Machine I	Machine II
Product A	2 hours	3 hours
Product B	1 hours	4 hours

Machine I is available for at most 1000 hours and Machine II is available for at most 2500 hours. If the profit made on product A is \$20 / unit and the profit made on product B is \$25 / unit.

a) Formulate a linear programming model for this problem. **(5 marks)**

b) Find the production level that will maximize profit and find the maximum profit using method of corners. **(20 marks)**

Continued...

Question 3 (25 marks)

a) An investment is growing at an effective rate of 12.4%. If the amount invested currently \$12000, what will the amount be in 6 years? **(6 marks)**

b) Find the present value of \$300 due after 6 years if the interest rate is 5.4% compounded monthly. **(6 marks)**

c) An \$800 loan is amortized by equal quarterly payments over 2 years. If interest is at the rate of 16% compounded quarterly, find the quarterly payment. **(7 marks)**

d) What is the effective rate that corresponds to a nominal rate of 20% compounded quarterly? **(6 marks)**

Question 4 (25 marks)

a) Differentiate the following function:

i. $f(x) = (5x^2 - 7x + 3)(7x^2 - 4x + 1)$ **(5 marks)**

ii. $f(x) = \frac{x^2 - 5x + 2}{3x + 2}$ **(6 marks)**

b) Suppose that $C(x) = 2x^3 - 4x^2 + 8x + 20$ is a cost function, where $C(x)$ is the total cost in dollars of producing x units of a product. When 10 products were produced, find the

i. marginal cost **(3 marks)**

ii. average cost **(5 marks)**

c) Determine $\int_{-1}^{1}(x^2 - 2x + 2)dx$ **(6 marks)**

End of Page.

Course: Managerial Mathematics
Code: BMT1014

Summary of Principal Formulas and Terms

Simple Interest

(i) Interest, $I = Prt$ (P = principal, r = interest rate, t = number of years)
(ii) Accumulated amount, $A = P(1 + rt)$

Compound Interest

(i) Accumulated amount, $A = P(1+i)^n$, where $i = \frac{r}{m}$, and $n = mt$
(m = number of conversion periods per year)

(ii) Present value for compound interest, $P = A(1+i)^{-n}$

Effective Rate of Interest

$$r_{eff} = \left[1+\frac{r}{m}\right]^m - 1$$

Future Value of an Annuity

$$S = R\left[\frac{(1+i)^n - 1}{i}\right]$$ (S = future value of ordinary annuity of n payments of R dollars periodic payment)

Present Value of an Annuity

$$P = R\left[\frac{1-(1+i)^{-n}}{i}\right]$$ (P = present value of ordinary annuity of n payments of R dollars periodic payment)

Amortization Formula

$$R = \frac{Pi}{1-(1+i)^{-n}}$$ (R = periodic payment on a loan of P dollars to be amortized over n periods)

Sinking Fund Formula

$$R = \frac{Si}{(1+i)^n - 1}$$ (R = periodic payment required to accumulate S dollars over n periods)

Basic Rules of Differentiation

(a) Constant, $f(x) = c: f'(c) = 0$
(b) Power rule, $f(x) = x^n: f'(x) = nx^{n-1}$
(c) Constant multiple a function, $cf(x): cf'(x)$
(d) Sum or difference rule, $f(x) \pm g(x): f'(x) \pm g'(x)$

(e) Product rule, $f(x) = u.v$: $f'(x) = uv' + vu'$

(f) Quotient rule, $f(x) = \frac{u}{v}$; $f'(x) = \frac{vu' - uv'}{v^2}$

(g) Chain rule: Derive $g[f(x)] = g'[f(x)]f'(x)$

(h) General power rule: Derive $[f(x)]^n = n[f(x)]^{n-1} f'(x)$

(i) Exponential function:
$f(x) = e^x$; $f'(x) = e^x$
$f(x) = e^{f(x)}$; $f'(x) = e^{f(x)}f'(x)$

(j) Logarithmic function:

Derive $\ln x = \frac{1}{x}$

Derive $(\ln u(x)) = \left(\frac{1}{u(x)}\right)[u'(x)]$

Basic Rules of Integration

(a) $\int k\,dx = kx + C$

(b) $\int x^n\,dx = \frac{x^{n+1}}{n+1} + C$

(c) $\int kf(x)\,dx = k\int f(x)dx$

(d) $\int (f \pm g)(x) = \int f(x)dx \pm \int g(x)dx$

(e) $\int e^x dx = e^x + C$

(f) $\int \frac{1}{x}\,dx = \ln x + C$

Determining Relative Extrema

$$D(x, y) = f_{xx}f_{yy} - (f_{xy})^2$$

If D > 0 and $f_{xx} > 0$, relative minimum point occurs at (x, y).
If D > 0 and $f_{xx} < 0$, relative maximum point occurs at (x, y).
If D < 0, (x, y) is neither maximum nor minimum.
If D = 0, the test is inconclusive.